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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/722,583	11/28/2000	Jun Sik Lee	0465-0758P	5244

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BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER

KEBEDE, BROOK

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 07/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/722,583	LEE, JUN SIK	
	Examiner	Art Unit	
	Brook Kebede	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Claim 1 recites the limitation "depositing a conductive layer on a substrate" in line 2. The conductive layer (i.e. 106 or 106a) was not deposited on the substrate. As Figs. 2C-2E, show, the conductive layer formed on the barrier film (105) wherein the region of the insulating film (101) and the plug (102). Therefore, "forming a conductive layer on a substrate" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The corrected or substitute drawings were received on April 30, 2002 in Paper No. 7. These drawings are acceptable.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (1A-1E) in view of Kadomura (US/5,230,772).

The rejection that was set forth in Paper No. 6 is maintained and repeated herein below as record.

Re claim 1, Applicant's admitted prior art essentially discloses a method for fabricating a capacitor of a semiconductor device comprising: depositing a conductive layer (16) on a barrier layer (15); forming a photoresist pattern (17) on the conductive layer (16); etching the conductive layer (16) using the photoresist pattern (17) as a mask to form a lower electrode (16a); removing the photoresist pattern (17) using an etchant; and forming a dielectric film (18) and an upper electrode (19) on a surface of the lower electrode (16a) (see Admitted prior art Figs. 1A-1E).

However, Applicant's admitted prior art does not specifically disclose the use of non-reactive etching gas with respect to the lower electrode during removing of the photoresist pattern.

Kadomura disclose the dry etching method for suppressing the micro-loading effects at the time of etching of the resist material by suing a known etching gas such as NH_3 to remove photoresist layer (see abstract). As Kadomura suggests, as result of suppression of the micro-loading effect excess etching to the substrate was avoided (see Kadomura, abstract and Col. 2, lines 51-68 through Col. 3, lines 1-24)

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to have provided applicant's admitted prior art with an etchant such as ammonia as taught by Kadomura because an over-etching would have been avoided during etching of the resist layer.

Re claim 2, as applied to claim 1 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein

the upper and lower electrodes are one of Ru, RuO, and a metal material alloyed with Ru (see Applicant's admitted prior art Fig 1C).

Re claim 3, as applied to claim 1 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein the etching gas is one of H₂O, NH₃, and N₂; a mixture of H₂, and O₂ in which an amount of H₂ is smaller than an amount of O₂, a mixture of H₂O, NH₃, and N₂, a mixture of N₂ and NH₃ a mixture of NH₃, and H₂O, or a mixture of N₂ and H₂O is used as the etching gas (see Kadomura, abstract).

Re claim 4, Applicant's admitted prior art discloses a method for fabricating a capacitor of a semiconductor device comprising: forming a conductive region (not shown) on a semiconductor substrate (not shown); forming an interleaving insulating film (11) having a contact hole (not labeled) therein over the conductive region (not shown); forming a contact plug (12) within the contact hole (not labeled); forming insulating film patterns (13 14) on of the interleaving insulating film (11) to expose the contact plug (12) and the interleaving insulating film (11) adjacent to the contact plug (12); depositing a barrier film (15) and a first conductive layer (16) on the contact plug (12) and the insulating film patterns (13 14); forming a photoresist (17) over the contact plug (12) between the insulating film patterns (13 14); sequentially removing the first conductive layer (16) and the barrier layer (15) on the insulating film patterns (13 14) using the photoresist (17) as a mask, thereby forming a lower electrode (16a) and a barrier film (15) in a U-shape in cross-section; removing the photoresist (17) using an etching gas; removing the insulating film patterns (13 14); and sequentially forming a dielectric film (18)

and an upper electrode (19) on the lower electrode (16a) and the barrier film (15) (see Admitted prior art Figs. 1A-1E).

However, Applicant's admitted prior art does not specifically disclose the use of non-reactive etching gas with respect to the lower electrode during removing of the photoresist pattern.

Kadomura disclose the dry etching method for suppressing the micro-loading effects at the time of etching of the resist material by using a known etching gas such as NH_3 to remove photoresist layer (see abstract). As Kadomura suggests, as result of suppression of the micro-loading effect excess etching to the substrate was avoided (see Kadomura, abstract and Col. 2, lines 51-68 through Col. 3, lines 1-24)

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to have provided applicant's admitted prior art with an etchant such as ammonia as taught by Kadomura because an over-etching would have been avoided during etching of the resist layer.

Re claim 5, as applied to claim 4 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein the upper and lower electrodes are one of Ru, RuO , and a metal material alloyed with Ru (see Applicant's admitted prior art Fig 1C).

Re claim 6, as applied to claim 4 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein the etching gas is one of H_2O , NH_3 , and N_2 ; a mixture of H_2 , and O_2 in which an amount of H_2 is smaller than an amount of O_2 , a mixture of H_2O , NH_3 , and N_2 , a mixture of N_2 and NH_3 a

mixture of NH_3 , and H_2O , or a mixture of N_2 and H_2O is used as the etching gas (see Kadomura, abstract).

Re claim 7, as applied to claim 4 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein the insulating film patterns comprise an oxide film (see Fig. 1B)

Re claim 8, as applied to claim 4 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein the insulating film patterns are formed by stacking two insulating films (see Fig. 1B).

Re claim 9, as applied to claim 8 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein the two insulating films are a nitride film and an oxide film (see Fig. 1B).

Re claim 10, as applied to claim 4 above, both Applicant's admitted prior art and Kadomura in combination disclose all the claimed limitations including the limitation wherein the barrier film is only formed on the contact plug within the contact hole (see Fig. 1C).

Response to Arguments

5. Applicant's arguments filed on April 30, 2002 in Paper No. 8 have been fully considered but they are not persuasive.

Applicant argued that the rejection is improper because applicant has not admitted that the material designated "Related Art" is "Prior art." Applicant further argued that ... the Examiner inappropriately relies on Kadomura. Kadomura does not disclose removing the photoresist deposited on an electrode material.

In response to the applicant's argument, the Examiner respectfully submits that such an argument is not commensurate with the scope of the claims, in particular, as stated above. In response to applicant's argument that applicant does not admit that the "Related Art" as "Prior Art," the Examiner respectfully disagrees that whether applicant labels it as "Related Art" or "Prior Art" it is an admitted prior art, i.e., applicant has knowledge and possession of the material prior to the conception of the instant application. Furthermore, the instant application claimed invention, as applicants presented, is an improvement of the "Related Art" or "Prior Art" with regarding etching of the photoresist. Therefore, this by itself an admission the existence of the "Prior Art" prior the invention of the instant application. Whether applicant labels it as "Related Art" or as "Prior Art," it is an admitted prior art. In addition, Where applicant has clearly admitted on the record that subject matter relied on in the reference is prior art. In this case, that subject matter may be used as a basis for rejecting his or her claims and may not be overcome by an affidavit or declaration under 37 CFR 1.131. *In re Hellsund*, 474 F.2d 1307, 177 USPQ 170 (CCPA 1973); *In re Garfinkel*, 437 F.2d 1000, 168 USPQ 659 (CCPA 1971); *In re Blout*, 333 F.2d 928, 142 USPQ 173 (CCPA 1964); *In re Lopresti*, 333 F.2d 932, 142 USPQ 177 (CCPA 1964).

In response to applicant's argument that Examiner inappropriately relies on Kadomura and Kadomura does not disclose removing the photoresist deposited on an electrode material, the Examiner respectfully disagrees with applicant's contention for the following reasons:

The admitted prior art teaches removing of the photoresist that deposited on an electrode (see Figs. 1C and 1D). Dry etching method to remove the photoresist film was not taught in the admitted prior art. However, the dry etching method to remove the photoresist film is not a novel

process and it is a well-known process in the art. In that regard, the combination of the admitted prior art and Kadomura disclosure provided all the teachings of the instant application claimed invention. Further, applicant's argument that Kadomura does not disclose removing the photoresist deposited on an electrode material is irrelevant because the combination of the admitted art and Kadomura would have made the instant application obvious. Finally, applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Therefore, the *prima facie* case of obviousness has been met and the rejection under 35 U.S.C. § 103 is deemed proper.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Correspondence

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brook Kebede whose telephone number is (703) 306-4511. The examiner can normally be reached on 8-5 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Brook Kebede
BK
July 9, 2002



Trung Dang
Primary Examiner